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SCIENCE: A Weekly Journal devoted to the Advancement of Science, publishing the official notices and proceedings of the American Association for the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

100 Liberty St., Utica, N. Y. Garrison, N. Y.
New York City: Grand Central Terminal.

Annual Subscription, $6.00. **Single Copies, 15 Cts.**

Entered as second-class matter January 21, 1922, at the Post Office at Utica, N. Y., Under the Act of March 3, 1879.

COOPERATION BETWEEN THE MAKERS AND USERS OF SCIENTIFIC APPARATUS IN AMERICA[1]

ALMOST exactly one year ago these two societies met upon a similar occasion for a joint dinner, following which there were presented several invited papers in which were discussed the importance of scientific apparatus in research, the good which might result from closer cooperation between the makers and users of apparatus and the lines along which such cooperation might take place. As a result of this discussion there was passed by the joint meeting a resolution urging the councils of the two societies to request the National Research Council to call a conference of representative makers and users of scientific apparatus at some convenient time during the forthcoming year.

In part as a result of this resolution the National Research Council called together early in January of the present year a small group for the purpose of discussing the desirability of calling a larger conference and of making arrangements therefor if such a larger conference seemed desirable. A very short discussion at once convinced those in attendance at the preliminary meeting that the larger conference was desirable. Accordingly the National Research Council through its division of research extension issued invitations to some eight different scientific societies and several government and semi-government departments to send representatives to such a conference to be held in Washington, March 23 and 24, 1923.

We are now met for the second annual joint dinner and it is appropriate upon this occasion to recount the results of the conference held about one month ago.

[1] Presented at the joint dinner of the American Physical Society and the Association of Scientific Apparatus Makers of the United States of America in Washington, April 20, 1923.

When the conference convened in the conference room of the National Research Council at 10:00 A. M., March 23, those who had been influential in calling the conference were very much gratified to find an attendance of nearly one hundred per cent. All but one or two of the original thirty or thirty-five persons invited either were present or sent substitutes. This large attendance seemed at once to answer the question which had frequently been raised: is such a conference worth while? The fact that thirty men were sufficiently interested to leave their busy offices and to spend two days in Washington discussing the American apparatus industry seemed to answer the question in the affirmative.

The conference was called to order by Mr. W. M. Corse, chairman of the division of research extension of the National Research Council. Dr. Vernon Kellogg, permanent secretary of the National Research Council, was introduced and in a few well-chosen words welcomed the conference on behalf of the Research Council and pointed out that such activities were quite in harmony with the ideals of the Council in furthering research. Following Dr. Kellogg's address Dr. George K. Burgess was elected permanent chairman of the conference. The success of the conference was due not a little to the skill of the chairman in encouraging discussion and in introducing the informality of a round table.

The program, as prepared in advance by the preliminary committee, was made up of four parts: (1) apparatus supply; (2) standardization of apparatus; (3) information service; (4) inspection service. It would, of course, be impossible at this time to give even a summary of the various papers and discussions. The stenographic reports of the conference cover some fifty single-spaced typewritten pages. But a few remarks may be made with regard to several of the papers in order to indicate some of the more important points brought out and discussed.

The first paper was by Mr. Walter Eimer on the importation of scientific apparatus. Mr. Eimer pointed out that previous to 1874 practically all scientific apparatus was imported. About that time, however, there was a desire for better service and for greater accessibility of supplies. As a result of this agitation the American apparatus industry was started. But as late as 1913, eighty per cent. of the total supplies and equipment needed in certain lines was being imported. The beginning of the European war greatly increased the demands which the American user made upon the American maker of apparatus. The maker of apparatus, however, in spite of difficulties in securing capable workmen and in getting the necessary raw material, rose to the occasion and in 1921 only five to eight per cent. of supplies in these same lines were being imported. At the present time manufacturing houses are adding one line after another with a consistent improvement in quality. In some cases the quality is superior to that which was formerly imported. For example, chemical glassware now available in this country has no equal in the European markets. Recent tariff legislation has resulted in preventing a European monopoly and in view of healthy competition does not seem likely to result in a monopoly in any line in this country.

The question of domestic apparatus manufacture was discussed jointly by the present speaker and Mr. M. E. Leeds. It was pointed out that the uses of apparatus may be divided into three main groups. First, apparatus required for instruction; second, for research; and third, for testing and control in industry. Apparatus intended primarily for instruction, whether for lecture or laboratory work, should be neat and attractive, should have the appearance of careful designing, but need not have the high precision required in research. For research, on the contrary, appearance is secondary while precision is a primary requisite. It was pointed out that it is desirable to develop a line of apparatus primarily intended for the individual demonstration of some of those phenomena in physics and chemistry which can not be demonstrated to a whole class and which nevertheless are of such a kind as can not be readily studied in the laboratory with the limited time available to the majority of students. Mr. Leeds spoke of domestic apparatus from the manufacturer's standpoint. The keynote of his talk may be indicated by the following quotation: "If we depend on foreigners for the development of our apparatus

we shall always be copyists and shall be one jump scientifically behind those from whom we buy." Not only is it important from the standpoint of our scientific work that we should develop our own methods and apparatus, but it is important that the manufacturer from his standpoint should cooperate in developing such new apparatus, since it frequently happens that a special laboratory instrument in a short time becomes a standard laboratory instrument for many types of measurements, or even an essential tool of a great industry. There is reason, therefore, for the closest cooperation between the maker and user of apparatus.

The subject of the instrument shop of the research and college laboratory was discussed by Dr. W. D. Collins. Dr. Collins pointed out that the laboratory shop could usually justify its existence because of the necessity in research and instruction for making repairs or special apparatus in a hurry and that in the construction of new apparatus it had the great advantage of bringing about personal contact between the designer and the maker, rendering unnecessary the rather expensive laborious task of making drawings, blue prints, etc.

The final paper on apparatus supply was by Dr. H. E. Ives on the subject of the manufacture of special apparatus not now made in the United States. Dr. Ives pointed out that a very great many of our most important pieces of apparatus for instruction and for research have originated abroad, as is indicated by the frequent use of foreign names in connection with instruments. Thus we have the *Lummer-Brodhun* photometer; the *Bragg* X-ray spectrometer; the *Dolezalec* electrometer. Although there are some pieces of apparatus bearing American names, nevertheless one is almost justified in concluding that there are more scientific ideas in Europe than in America, the moral of which fact being obviously of joint interest to makers and users of apparatus. The difficulties of manufacturing in America some of the special apparatus needed are very great. Among them may be mentioned such items as scarcity of skilled labor, high labor costs and the general tendency in America to quantity production. We ought, however, to originate more apparatus here and to cultivate a better respect for instruments and a better understanding between those who make them and those who use them.

The subject of standardization of apparatus proved unexpectedly interesting to those who had not given particular thought to this question. The first paper in this group was by Mr. J. M. Roberts on "Limitations of types and sizes." A systematic effort has been made by the makers of and dealers in chemical glassware and supplies, cooperating with the American Chemical Society and other users, toward the standardization of sizes and dimensions for the purpose of eliminating the large number of comparatively little used items and sizes. By means of a questionnaire it was found that a fairly large number of makers and users would agree upon certain eliminations. As an example of what was accomplished, in the catalogue of one supply house which listed one hundred forty-eight different types of gas burners, seventy were eliminated. Some of those eliminated had been designed fifty years ago. Out of two hundred twenty-seven items covering chemical porcelain, ninety-nine were eliminated. One hundred twenty-three out of one hundred ninety different forms of gas analysis apparatus were dropped; one hundred seven out of one hundred ninety-nine sizes and kinds of funnels. In all, the committee in charge of this work eliminated some eighteen hundred out of thirty-two hundred items without in any way restricting methods either in instruction or research. More difficulty was experienced in the standardization of physical apparatus. But even here a careful study made it possible to eliminate some six hundred fifty sizes and designs out of two thousand items listed. Mr. Roberts reported that the work was being continued and that the apparatus makers were cooperating with and would welcome further suggestions from the educational committees of the various scientific societies interested.

It is unnecessary to comment extensively on the importance of this study which Mr. Roberts and his associates have made. The savings as a result of economy of manufacture and of reduction in capital tied up in supplies are being passed on to the consumer in the shape of reduced costs. Already one manufacturer has announced reductions of from ten to twenty-five per cent. in net prices.

Mr. H. C. Dickinson discussed the standard-

ization of parts on the basis of the experience of the automotive industry, as an illustration of what might be done along, of course, somewhat different lines in connection with scientific apparatus. Mr. Dickinson pointed out that largely through standardization of parts and of methods a Ford car costs a very small sum to build, whereas were an engineer to start out from the beginning it would cost at least one hundred thousand dollars per car. In the automotive industry this standardization of parts has been accomplished without in any way restricting the designer. Similar standardizations could be made in scientific apparatus without restricting the scientist as to method or choice of apparatus.

Dr. G. K. Burgess spoke on standardization of method of measurement. If the eliminations in apparatus catalogs already noted have taken place without standardization of method, how much more might be accomplished if scientists could agree upon certain standards with regard to methods of measurement.

The subject of information service was discussed by Mr. Boulton Earnshaw, Dr. W. E. Tisdale and Mr. M. E. Leeds. Mr. Earnshaw pointed out from the standpoint of the purchasing agent the desirability of readily accessible sources of information as to where various supplies and pieces of apparatus could be obtained. One difficulty which he mentioned was the location of manufacturers of certain rare chemicals. Dr. Tisdale spoke of the Research Information Service of the National Research Council and stated that the Council was very glad to be of assistance in this connection. Mr. Leeds discussed the importance of scientific bulletins concerning the use of apparatus and stated that very frequently such bulletins prepared by manufacturers had actually been used for class purposes.

The final topic, inspection service, was discussed by Dr. E. W. Washburn, who stated that manufacturers of apparatus could perform a very valuable service to users by sending around well trained inspectors who could adjust special apparatus or make simple repairs. Frequently such a skilled repair man could do in a few moments what would take the laboratory mechanician several hours to do even though the apparatus did not have to be sent back to the factory for repair.

Perhaps the most important part of the meeting, as well as in some ways the most interesting, was the general discussion at the third half-day's session, March 24.

Those of us who had the privilege of attending the conference were convinced that our time was well spent and that we were amply repaid individually for our efforts. But we of course represented actually only a small number of users and makers and the question may well be raised, what was the value of the conference to American scientists and to the American apparatus industry in general. Was it simply another activity interesting enough in itself, but of no possible permanent or general value? The answer to these questions depends largely upon one's viewpoint.

The first and most important thing in my mind with regard to the conference is the simple fact that it *was* held. For the first time a group of makers and users of apparatus gathered together for a common purpose to discuss problems in which they are mutually interested. Whatever may be the outcome of this movement the simple fact is that this conference marks its beginning. If the solution of any problem is half completed when the problem is clearly stated, it is certainly true that an important step in the solution of any problem is the recognition of its existence. The conference discussed many things. And there can be no question but that the problem of closer cooperation between makers and users is an important one, whatever further work may be done in this direction.

Closely associated with this simple fact that the conference was held is a group of rather intangible results likewise of most importance to those of us who had the privilege of attending. Some three dozen men representing all branches of the apparatus industry and of research and pedagogical interests met each other, became more or less acquainted and came to have somewhat of an appreciation of each other's problems. The inevitable result of such contacts is to develop a spirit of tolerance and of good will. If we think that the bill which is rendered us for apparatus or supplies is a little too large we have only to keep in mind the fact that apparatus makers have no subsidy, that they must run their business with a reasonable margin of profit in order that they

may be able to undertake some of the newer developments which so many of us users desire. If the General Electric Company, for example, had not made money from its business and had not had the foresight to spend that money in research the whole world would not now be enjoying the economies which come from the use of the tungsten lamp. Could we have foreseen the immense value to civilization of the tungsten lamp it would have been commendable for the United States government to have spent a million dollars for research in this direction. We can see it all very clearly now, for our "hindsight" is always better than our foresight. And I feel confident that fifty years from now scientists can look back upon the present decade and the two or three following and point out the value of cooperation between makers and users of apparatus. It perhaps requires some courage now to think that the movement is worth while and is likely to produce tangible results.

To offset the indefiniteness of some of the results of this conference, valuable as those results are, certain steps were taken which are somewhat more tangible. It was realized at the outset that the conference would fail utterly if its influence were felt only by the few who attended. Accordingly there was passed by the conference a resolution requesting the National Research Council to form a permanent committee to be known as the "Committee of apparatus makers and users" which should consist of representatives (one or more as indicated) from the following technical societies and organizations: American Chemical Society, American Physical Society, American Ceramic Society, American Institute of Electrical Engineers, Optical Society of America, American Electrochemical Society, Manufacturing Chemists Association, American Society for Testing Materials, Bureau of Standards (two representatives), Association of Scientific Apparatus Manufacturers of the United States of America (six representatives) and additional members at large to be appointed by the committee itself. It was suggested that there should be formed an executive committee of the main committee, which should consist of seven members selected by the main committee. It would be the duty of this executive committee to initiate such projects as might be suggested by the several members of the larger committee or by others interested. The executive committee subsequently added the Society of Automotive Engineers and the American Society for Steel Treating to the list named above. It is proposed to have a meeting of the large committee once a year, which meeting should discuss the general question of apparatus manufacture and use and which should be open to all interested.[2]

Among the questions which doubtless will come up for discussion and which may result in the initiation of important problems of a cooperative nature may be mentioned the question of facilities for making special apparatus, further standardization of apparatus and supplies, the development of an inspection service and the like.

It is to be hoped that all of those interested directly or indirectly in American science, whether from the standpoint of actual users of apparatus or from the standpoint of those who profit financially or otherwise from scientific research, will heartily support this movement to build up a strong apparatus industry in America to the end that American science may be strengthened. Those of us who are interested in this movement are not thinking of the question from the standpoint of narrow patriotism, for a scientific fact is just as valuable to the civilized world whether discovered in America or in Europe. But we do feel that American science, just like the American citizen, has an individuality and an independence which, from the standpoint of our contribution to world service, we can well afford to cultivate.

F. K. RICHTMYER
CORNELL UNIVERSITY

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SUMMARY OF THE PERMANENT SECRETARY'S SEMI-ANNUAL REPORT, MARCH 31, 1923

THE work of the association has proceeded satisfactorily during the first half of the fiscal

[2] The National Research Council announces that through its division of research extension it has formed the Committee of Apparatus Makers and Users essentially along the lines of the resolution passed by the conference.

year 1923. The relations of the association with the two divisions and with the State College (Pennsylvania) Local Branch, as well as the affiliated academies, have been continued as usual. Information regarding membership is shown in the following tabulations:

MEMBERSHIP IN THE A. A. A. S., MARCH 31, 1923

Sustaining members		3
Life members:		
Pacific Division	32	
Southwestern Division	3	
Rest of Association	334	
Total		369
Annual members in good standing:		
Pacific Division	1,036	
Southwestern Division	106	
State College Branch	54	
Affiliated Academies	1,328	
Rest of Association	7,348	
Total		9,872
Annual members in arrears for 1922 and 1923:		
Pacific Division	65	
Southwestern Division	20	
State College Branch	3	
Affiliated Academies	58	
Rest of Association	333	
		479
Annual members in arrears for 1923 only:		
Pacific Division	129	
Southwestern Division	35	
State College Branch	3	
Affiliated Academies	123	
Rest of Association	677	
Total		967
Total of names on roll		11,690

CHANGES IN MEMBERSHIP DURING FIRST HALF-YEAR, 1923

Gain in membership:		
Reinstatements	13	
New members (4 life, 770 annual)	774	
Total gain		787
Loss in membership:		
Dropped October 1 last for non-payment of dues	455	
Resignations	217	
Deaths	71	
Total loss		743
Net gain		44
Transfers from annual to life membership		19

SEMI-ANNUAL RECORDS OF MEMBERSHIP SINCE SEPTEMBER 30, 1920

	In good standing	Total enrollment
September 30, 1920	10,002	11,442
March 31, 1921	9,637	11,524
September 30, 1921	10,160	11,547
March 31, 1922	9,911	11,652
September 30, 1922	10,566	11,646
March 31, 1923	10,224	11,690

The membership is being maintained and slightly increased each year. Payments of annual dues are becoming much more prompt. Life memberships have increased in number very satisfactorily this year. Since last October 1, 23 new life members have been enrolled, 19 of these representing transfers from annual to life membership. It is hoped that members will increasingly realize the advantages of life-membership, to themselves as well as to the association, and that the number of life members will continue to increase.

The financial affairs of the association are in excellent condition. The work thus far undertaken is being adequately supported. It should be noted, however, that additional lines of activity for the advancement of science should be undertaken as soon as the finances will permit. And there are many ways in which the work of the association might be extended.

Preparations for the Los Angeles meeting next September are progressing very well indeed, owing to the efficient work of Mr. W. W. Sargeant, secretary of the Pacific Division, and to that of the general secretary, Dr. D. T. MacDougal. A preliminary announcement of the meeting will be sent to all members. Correspondence regarding the meeting should be addressed to Mr. W. W. Sargeant, Golden Gate Park, San Francisco, Calif.

The local committee for the third Cincinnati meeting has been organized, with Dr. Louis T. More as chairman, and much of the preliminary work has already been completed. Each section of the association will have a local representative and the societies meeting at Cincinnati next December are asked to make all arrangements for their sessions through the local representatives of their respective sections.

BURTON E. LIVINGSTON,
Permanent Secretary.

GEORGE LINCOLN GOODALE
1839-1923

BOTANY, in America as elsewhere, owes much to men who acquired an interest in plants while studying medicine or who adopted the medical profession as affording a livelihood while permitting them to follow more or less seriously botany as an avocation. Howard Kelly has

written a delightful series of biographic sketches of a few American physicians to whom botany was pleasure in the sense that it was what they paid for, while practice of their profession was work in the sense that it was what they were paid for.

Engelmann and Chapman are outstanding among Americans of this type: but Torrey, Gray, Farlow and Goodale mark the transition to the modern type of professional botanists, to whom this branch of science is at once vocation and avocation. Equipped with the means of practicing a remunerative profession, they found awaiting them the opportunity to break into the new profession of teachers of the science to which they were attached.

Not only in preparation but in successful practice, Dr. Goodale was a doctor in the sense in which an old-fashioned friend expressed himself to me nearly half a century ago as thinking of the word—a physician; or an elderly person to whose name certain letters of the alphabet have been appended by colleges in recognition of conspicuous service rendered the public; for in those days, on this side the ocean, men were only beginning to bear that stamp of academic approval that our great universities give annually now to hundreds of men who have prepared and defended a dissertation in some field of learning.

Though he lacked this modern prerequisite for even an instructorship in a worthy institution, Goodale from the first was a doctor literally and within the meaning of my friend; and in due time Amherst, where he had graduated, Bowdoin, where he first taught, and Princeton stamped with their approval his scholarship and public service. Even more indicative of such approval are the memberships accorded him in bodies like the National Academy of Sciences, the American Philosophical Society and the American Academy of Arts and Sciences; and offices such as the presidency of the American Association for the Advancement of Science, which he held in 1890.

Professorships in the sciences were not so minutely divided two generations ago as they are now. When, after three years of medical practice, Dr. Goodale entered the faculty of Bowdoin College in 1868, it was as a professor of natural science. Four years later his brilliant exposition of this group of sciences opened to him an instructorship in botany at Harvard, which developed quickly into an assistant professorship and a professorship—from the active duties of which he retired as professor emeritus fourteen years ago at the scriptural age of three score years and ten.

It is not without significance that with the title of instructor in botany his appointment at Harvard carried also that of lecturer on vegetable physiology. Asa Gray, the outstanding figure in American botany, whose contributions to the science were in the field of what is now called taxonomy, saw and understood and planned far beyond the limits of his own specialty; and the entry of Goodale and Farlow into the faculty of Harvard under President Eliot's fostering of the sciences gave to that great university prominence in this science fifty years ago.

Though I never had the privilege of study under Professor Goodale, I came into close personal contact with him in 1880, when I went to Cambridge for graduate work with Farlow, Hagen and Mark; and it was my privilege frequently to listen to his brilliant lectures, which I never have heard surpassed in his field. It was in his laboratory that I first saw—and used during the summers of 1883 and 1884 when at his request I took charge of the summer session in botany—the prototypes of the present-day auxanometers and klinostats; and with him more or less successfully constructed and applied the osmometers with which Wilson recently had shown talented manipulative skill in Pfeffer's laboratory.

Dr. Goodale was alert in framing unanswered questions and ingenious in devising means of answering them. If his contributions to botanical knowledge be not found numerous and important, perhaps explanation is to be found in the possession of those traits which lead a man to devote possibly productive time to over-careful detail preparation for what he is to present in the lecture-room rather than to the methodical but often discouragingly broken drudgery of investigation, at first hand, or with students whose names appear as authors of dissertations.

Professor Goodale was a genial man. Those who admired him had confidence in him. Com-

mercial Boston had many a stipend for investigation or travel at his suggestion. Nowhere in the world is to be found a counterpart of the superb representation of our flowers in glass made by the Blaschkas under his direction as curator of the botanical museum of Harvard, with the financial backing of Mrs. Ware and her daughter. Those who really knew him loved him. Since the passing of Professor Gray, a generation ago, the memory of my infrequent visits to Cambridge has been brightened by contact with Professor Goodale and one or more of the enthusiastic unprofessional botanists who were his intimate friends and with whom he continued to share the curious interest in nature that is the foundation of most really serviceable work in botany, either didactic or productive; an interest of which the beginnings are to be found recorded here and there in herbarium specimens of choice Maine plants collected in the early days when he was called on to teach "natural science, mineralogy, botany and applied chemistry" at Bowdoin College.

WILLIAM TRELEASE
UNIVERSITY OF ILLINOIS
MAY 14, 1923

SCIENTIFIC EVENTS

MOTION PICTURE OF THE TOTAL ECLIPSE OF THE SUN[1]

THERE have been in the past several proposals to take a cinema film of a total eclipse of the sun, but the first real outcome of these proposals is the film now being shown at the Royal Albert Hall. The pictures illustrate the experiences and the work of the astronomers of the expedition, under Professor W. W. Campbell, to Wallal, on the northwest coast of Australia, from the time they left Perth until after the eclipse on September 21. The journey to Broome was made on the S.S. *Charon* and afterwards on the lugger *Gwendoline,* towed by a lighthouse tender, to Ninety Mile Beach. On account of the great rise and fall of the tides, the ship had to anchor five miles out, and the astronomers with all their baggage had to be landed in boats through the surf. The equipment was then transported on donkey wagons to the site selected for the camp and in this work the aboriginal inhabitants of the country, both men and women, gave considerable assistance. The large amount of dust, which rose in clouds wherever there was any work being done, caused great inconvenience. Nevertheless a large camp was soon set up and the assembling of the instruments commenced. The process of erection of the tower telescope and of the equatorials and cœlostats, as well as the various rehearsals in changing plates and uncovering object-glasses, are well illustrated. The part of the film showing the solar corona is good, considering that it was taken with a cinema lens, but a better picture could easily be constructed from the negatives taken by the eclipse party.

The film will enable those who are interested in scientific work to appreciate the difficulties which eclipse observers often have to face. Large and cumbersome instruments have to be transported long distances and often erected in almost inaccessible places where little or no skilled labor can be obtained. The conditions at Wallal were probably more difficult than usual, but were bravely faced and overcome. A wireless apparatus was erected to keep the eclipse party in communication with the outside world and a weekly aeroplane service was instituted. The film is well worth seeing by those interested in the work of scientific expeditions. It would have been too much to expect that a film of this kind, taken under such difficult conditions, would come up to the standard of films produced by special actors in artificial conditions. However, the fact that the actual work of the astronomers is interspersed with pictures illustrating the life of the natives should make the film one of more general interest. With these additions the showing of the film takes a little over an hour. The attempt to produce a film showing the actual work of a scientific expedition is one which deserves every encouragement and we wish it every success.

[1] From *Nature.*

CANADIAN STATIONS IN THE ARCTIC

THE *Royal Geographical Journal,* quoting from the annual report for 1921-22 of the Royal Canadian Mounted Police, gives details of the progress lately made towards the establishment of fixed administrative stations

in the Arctic Islands over which the Dominion exercises control. The previous report had described the establishment of the police detachment at Ponds Inlet, one of three posts which it was intended to establish, the plan being to place the other two on North Devon and Ellesmere islands respectively. In July, 1922, the C.G.S. *Arctic*, Captain Bernier, sailed from Quebec with Inspector Wilson—a commissioned officer—and eight other ranks of the police, the Department of the Interior being represented by Mr. J. D. Craig. She carried building materials and stores for two of the posts, those for the North Devon post being left to be taken north in 1923. The entrance to Ponds Inlet was reached on August 15, but, pack-ice making it impossible to enter, the *Arctic* proceeded to Jones Sound. Ice likewise blocked Fram Fiord, on the south coast of Ellesmere Island, which had been chosen as the site of the post; but a fairly suitable place was found on the shore opposite Smith Island and here Inspector Smith decided to winter, the landing of stores being completed after hard work on August 28. The spot has been named Craig Harbor and here the inspector remains with one non-commissioned officer and five constables. A postoffice has been established, but it can hardly be expected to function for any large part of the year. As the headquarters of the three northern detachments it is thought that Dundas Harbor on the south coast of North Devon offers the best advantages, Lancaster Sound being usually clear of ice for a longer time than Jones Sound. The stores, etc., for Ponds Inlet were landed on the return voyage early in September, access to the post being still much hampered by ice. From the west of Arctic Canada it is reported that the headquarters of the "Arctic" Sub-district are being removed from Herschel Island to Aklavik in the Mackenzie delta, which has of late become the trading center of the district. Fort Macpherson is being abandoned, while the Tree River detachment is being strengthened and a new detachment will be established at Cambridge Bay, on the south coast of Victoria Island, about two hundred miles from Tree River, itself a very remote post. The report states that in April, 1922, a patrol visited Mr. Knud Rasmussen's camp on an island near Melville peninsula.

THE CONGRESS OF THE GERMAN SOCIETY FOR INTERNAL MEDICINE[1]

THE German Society for Internal Medicine, which meets every two years in Wiesbaden, has arranged to hold its meeting every alternate year in another large German town and Vienna was chosen for this year. Professor Wenckebach organized the convention. More than 1,400 physicians took part in the proceedings, including visitors from northern Europe, Asia, Italy and the New World, so that this meeting was really international, the first of its kind in Vienna since 1913. The proceedings were grouped under three heads: (1) epidemic (lethargic) encephalitis; (2) hypertension and (3) internal secretion. Two eminent men were asked to give an introductory report on each of these subjects, one dealing chiefly with the anatomic or physiologic, the other with the clincial side of the problem.

In connection with the congress, an exhibition of the latest achievements of chemistry, electrotherapeutics and medical technic was opened, in which the changes brought about by these factors in the medical armamentarium were well illustrated. The blood pressure apparatus, the microscope, the fluoroscope, the roentgenogram and metabolimeter are now indispensable and ready-made pills and hypodermics are always at hand.

The scientific program was carried out in magnificent surroundings in the reception hall of the former emperors of Austria, which was selected and adapted for the purpose. The municipality of Vienna and the president of the republic gave receptions in honor of the guests, and social gatherings and excursions to neighboring watering places and health resorts in the Alps served to relieve the sober work of the convention. The scientific proceedings lasted from April 9 to 12, with Professor Wenckebach in the chair. As a large number of papers and reports were presented, with the exception of the introductory papers, ten minutes was allowed for each paper and discussion was limited to four minutes.

EXPERIMENTS ON LIVING ANIMALS

AT the fifth annual stated meeting of the American Society of Mammalogists, held May

[1] From the *Journal of the American Medical Association*.

15 to 17, 1923, in the Academy of Natural Sciences, Philadelphia, Pa., the following resolution was adopted:

Whereas, it is a fact known to all thinking people that most of the great advances in medicine and surgery have been made as a result of experiments on living animals, especially mammals, and

Whereas, it is the belief of our eminent physicians, surgeons and veterinarians and all others having great responsibility for the health of human beings and of animals, that future advances in these fields will be made chiefly as the result of similar experiments, and

Whereas, it is known that these experiments almost invariably are conducted humanely and with a minimum of discomfort to the animals used, and

Whereas, there is an organized movement being carried on by certain misinformed and misguided individuals who seek to prevent or seriously interfere with such experiments;

Be it resolved, that we, members of The American Society of Mammalogists, in annual convention assembled in the city of Philadelphia, on the sixteenth day of May, 1923, are of opinion that, in the best interests of real humanity, animal experimentation, including vivisection, as practiced in our laboratories to-day, should continue unhampered.

ACTIVITIES OF THE ROCKEFELLER FOUNDATION

A REVIEW of the work of the Rockefeller Foundation in 1922, written by its president, Dr. George E. Vincent, will be issued shortly. As the close of the year brought the Foundation almost to the completion of its first decennium, a résumé of the activities of the organization since its establishment in 1913 has been included in the annual report. The work done by the foundation in 1922 directly and through its departmental agencies—the International Health Board, the China Medical Board and the Division of Medical Education—is summarized as follows:

Endowed chairs of medicine and of surgery in Hongkong University;

Pledged $1,125,000 toward new buildings for the College of Medicine of the State University of Iowa;

Contributed to the current maintenance of two medical schools in Canada;

Completed the buildings, strengthened the faculty and wholly financed the Peking Union Medical College;

Agreed to appropriate $300,000 toward laboratories and premedical teaching in two Chinese institutions and in one missionary university in Peking;

Helped 19 hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses;

Promised to cooperate in the rebuilding and reorganization of the medical school of São Paulo, Brazil, and of the medical school of Siam in Bangkok;

Made a survey of medical schools in Austria, Czechoslovakia, Germany, Hungary, Poland and Switzerland, and studies of English and Scotch methods of clinical teaching;

Sent eminent medical men as visiting professors or consulting officers to China, the Philippines, Brazil and Salvador;

Arranged for a commission of medical scientists from Strasbourg to visit the United States and England;

Gave emergency aid in the form of medical literature, laboratory supplies and apparatus, fellowships and stipends to promising investigators and teachers in the Pasteur Institute of Paris and in many other European centers;

Pledged two million dollars toward the site, building and equipment of a school of hygiene in London;

Cooperated with state boards of health in maintaining institutes and instruction for health workers;

Shared in malaria control in 34 county-wide and 32 town demonstrations in ten southern states and continued field studies and surveys in the United States, Porto Rico, Nicaragua, Brazil, Palestine, Australia and the Philippines;

Cooperated with the Mexican and other governments in restricting the prevalence of yellow fever;

Resurveyed centers of hookworm infection in four southern states, and carried on control work in 21 foreign governmental areas;

Took part in promoting full-time health service in 163 counties in 18 states of the United States, and in several counties in Brazil;

Agreed to support for five years the disease-reporting service and for three years the international exchange of health personnel program of the Health Section of the League of Nations;

Provided fellowships in public health, medicine,

nursing, chemistry and physics to 237 advanced students from 23 countries;

By consultation and providing of personnel aided public health administration in the United States, Australia, Brazil, Canada, Central America, Czechoslovakia, France and the Philippines;

Contributed to mental hygiene projects, demonstrations in dispensary administration, hospital information service, surveys of nursing education and hospital management, the organization of tuberculosis work in France, the training of French health visitors and other undertakings in the fields of public health and medical education.

SCIENTIFIC NOTES AND NEWS

PROFESSOR CHARLES S. SARGENT, of Harvard University, director of the Arnold Arboretum, has been awarded the Frank N. Meyer Agricultural Medal by the American Genetic Association "for distinguished services in the field of foreign plant introduction." The medal, which had been sent to Harvard to be bestowed upon Dr. Sargent, was presented by President Lowell at a luncheon given by Dr. Sargent for the overseers' committee on the Arnold Arboretum.

A CITATION for the award of a distinguished service medal to Dr. Harvey Cushing, Moseley professor of surgery at the Harvard Medical School, has been approved by Secretary of War Weeks. The citation refers to Dr. Cushing as senior consultant of surgery of the American Expeditionary Forces and in direct charge of treatment of gunshot wounds of the first army hospital during the Meuse-Argonne offensive and says: "He performed conspicuous and distinguished services to the government" and "his individual efforts in that capacity saved the lives of many severely wounded soldiers."

JOHN V. N. DORR, metallurgist of New York City, was elected on May 7 to honorary membership in the Society of Phi Lambda Upsilon, through the Columbia Chapter, at a dinner given in his honor by the National Organization at the Chemists' Club, New York City.

WE learn from *Nature* that the Royal Society of Edinburgh has awarded the Makdougall-Brisbane prize (1920-1922) to Professor W. T. Gordon for his paper on "Cambrian organic remains from a dredging in the Weddell Sea," published in the *Transactions* of the Society within the period, and for his investigations on the fossil flora of the Pettycur Limestone, previously published in the *Transactions*.

THE members of Sigma Gamma Epsilon, at the University of Michigan, recently gave a luncheon in honor of Professor Carl O. Sauer, who leaves the university at the end of the summer session to become head of the department of geography of the University of California.

AT the anniversary meeting of the Linnean Society on May 24, the High Commissioner for New Zealand received the Linnean gold medal on behalf of Mr. T. F. Cheeseman, of the Auckland Museum, New Zealand. Dr. John Isaac Briquet, director of the Geneva Botanical Garden, has been elected a foreign member of the society.

DEAN E. A. HOLBROOK, of the Pennsylvania State College School of Mines, has been retained by the United States Coal Commission to prepare a report on mine safety work in this country.

PROFESSOR HERMAN H. CHAPMAN, of Yale University, has been appointed a member of the Connecticut State Park and Forest Commission.

AT the inauguration of President Samuel Wesley Stratton, of the Massachusetts Institute of Technology, to occur on June 11, the American Association for the Advancement of Science will be officially represented by Mr. Calvin W. Rice, secretary of the American Society of Mechanical Engineers, and by Professor Samuel C. Prescott, professor of biology and public health in the Massachusetts Institute of Technology.

THE appointment of Dr. Frederick E. Breithut as chemical trade commissioner of the United States to Germany and other European countries has been announced by the Department of Commerce. Dr. Breithut will be attached to the staff of the commercial attaché; Charles H. Herring, Berlin, but will study the chemical industries in England, France and elsewhere in Europe where there have been developments of interest to the United States.

DR. P. A. MAPLESTONE, lecturer on protozoology at the Liverpool School of Tropical Medicine, has been appointed assistant director of the research laboratory at Sierra Leone.

A. W. AMBROSE, assistant director of the Bureau of Mines, has resigned to become associated in an executive capacity with the Empire Companies, with headquarters at Bartlesville, Oklahoma.

DR. RICHARD B. MOORE, chief chemist of the Bureau of Mines, has resigned his post to take effect on June 1. Dr. Moore will be succeeded by Dr. Samuel C. Lind, who has for some years acted as a superintendent of the Rare and Precious Metals Experiment Station of the bureau at Reno, Nevada. Dr. Moore will enter the commercial field with a firm of consulting chemists and metallurgists in New York city.

PROFESSOR W. K. KIRBY, head of the petroleum engineering department of the Colorado State School of Mines, leaves early this month for New York, where he has accepted a position with the J. G. White Engineering Corporation.

C. G. STUPP, formerly assistant chief chemist of the research department laboratory of The Barrett Company, New York City, and more recently with the National Aniline and Chemical Company, Buffalo, New York, has resigned to accept a position with Weiss and Downs, chemists and chemical engineers, New York City.

DR. J. J. SKINNER, of the Bureau of Plant Industry, has returned to Washington, having completed the supervision of fertilizer applications in the cooperative experiments and inaugurated fertilizer experiments with cotton in Fayetteville and New Bern, North Carolina.

LANGDON WARNER, recently director of the Pennsylvania Museum in Philadelphia, who was a member of the Pumpelly-Carnegie expedition to Trans-Caucasia in 1904-05, assistant curator of oriental art in the Boston Museum of Fine Arts from 1906 to 1913, and subsequently field director of the Cleveland Museum of Art, has been appointed fellow of the Fogg Art Museum of Harvard University for research in Asia.

DR. EDWIN E. SLOSSON, director of Science Service, sailed on May 29 for Europe to attend the commemoration of the three hundredth anniversary of the founding of the city of Gothenburg, Sweden, and an exposition of Swedish industries and culture. Dr. Slosson plans also to investigate some of the chemical industries of Sweden. He will return early in July.

GEORGE S. RICE, in his official capacity as chief mining engineer of the United States Bureau of Mines, is attending the International Mining Exhibition in London June 1 to 15. He will spend several months in the British Isles and on the Continent in the study of coal mining. While in Great Britain, he will give an illustrated lecture at the University of Sheffield.

LEAVE of absence has been granted to Mr. N. A. Wood, of the Museum of Zoology of the University of Michigan, to take part in an expedition being financed by Ginling College, Nanking, China, which will penetrate into certain little-known parts of China.

F. L. STEVENS, professor of plant pathology in the University of Illinois, will spend the summer collecting fungi in Central America, chiefly in Costa Rica.

KIRTLEY F. MATHER sailed from Seattle on June 7 for Alaska, where he will be engaged in field examinations in the Iliamna-Katmai region under the auspices of the United States Geological Survey. After his return, about October 1, he will serve until February 1 as visiting lecturer in geology at Harvard University.

DR. GEORGE E. BEYER, entomologist of the state board of health, New Orleans, formerly adjunct professor in biology at Tulane University School of Medicine, has been requested to aid in stamping out malaria in San Domingo. Dr. Oscar Dowling, president of the state board of health, has granted Dr. Beyer a leave of absence.

DR. LOUIS L. WILLIAMS, JR., Richmond, Virginia, engaged in malaria control work with the state department of health, has been appointed to represent the United States on the epidemic committee of the League of Nations. Dr. Williams sailed on May 1 for Italy, where he will spend four months studying malarial problems.

AMONG the foreign physicians who are expected to take part in the meeting of the American Medical Association at San Francisco during the week of June 25 are Dr. F. G. Banting, discoverer of insulin; Professor Wenckebach of Vienna, noted for his work on

the use of quinin derivatives in the treatment of heart disease; T. C. Routley, secretary of the Canadian Medical Association, and Dr. S. A. K. Wilson, of London, who will speak on the relation of accidents to nervous diseases.

PROFESSOR BERNHARD H. DAWSON, chief astronomer in the observatory of La Plata, left Argentina in the latter part of May for six months' leave of absence which will be spent chiefly in the United States.

DR. WM. H. NICHOLS, on the occasion of the twenty-fifth anniversary of the founding of the Chemists' Club, New York, on May 2, presented the club with five hundred shares of the stock of the Chemists' Club Building Corporation, valued at $25,000. The following officers were elected: *President,* F. J. Metzger; *resident vice-president,* Allen Rogers; *non-resident vice-president,* E. R. Weidlein; *treasurer,* A. G. Robinson; *secretary,* Herbert G. Sidebottom; *trustees,* A. A. Holmes and Thomas R. Duggan.

PRESIDENT EDWARD A. BIRGE, of the University of Wisconsin, was the principal speaker and guest of honor at the annual banquet and meeting of the Phi Beta Kappa fraternity, June 6, at the University of Chicago.

DR. EDGAR T. WHERRY, of the United States Bureau of Chemistry, lectured before the Kentucky Chapter of the Society of the Sigma Xi on May 18, his subject being "Studies of soil acidity and plant distribution."

PROFESSOR MORTIMER E. COOLEY, dean of the engineering school of the University of Michigan, will deliver the commencement address at the Armour Institute of Technology. His subject will be "The responsibility of education."

DR. E. E. SLOSSON, of Science Service, Washington, D. C., gave an address on "The human side of science," before the fourth annual meeting of the New Hampshire Academy of Science, on May 26.

DR. HENRY H. DALE, London, delivered the Oliver-Sharpey lectures at the Royal College of Physicians of London on May 1 and 3 on the "Activity of the capillary blood vessels and its relation to certain forms of toxemia."

THE twelfth biennial Huxley lecture, on recent advances in science and their bearing on medicine and surgery, will be given at the Charing Cross Hospital Medical School by Professor Sir Arthur Keith, F.R.S., on June 27.

C. G. DARWIN, grandson of Charles Darwin, recently addressed the Southern California Section of the American Chemical Society, at Los Angeles, on "The periodic system." Mr. Darwin has been appointed to the new Tait chair of natural philosophy at Edinburgh University.

A COMMITTEE has been formed in England to commemorate the services of the late Dr. W. H. R. Rivers to anthropology and psychology, which includes Sir Charles Sherrington, president of the Royal Society, Sir Humphry Rolleston, president of the Royal College of Physicians, Sir James Fraser, Dr. Henry Head, Professor Elliot Smith and Dr. C. S. Myers. The treasurer is Dr. L. E. Shore, St. John's College, Cambridge, to whom contributions may be sent. It is intended that the proceeds of the fund shall be devoted to the promotion of those sciences in which Dr. Rivers took a special interest, but until the amount and the wishes of the contributors are known no definite decision will be reached.

THE celebrations in France of the Centenary of Pasteur began in Paris on May 17 when the foreign delegates were received by M. Millerand, the president of the Republic, at the Elysée. On the following morning the Pasteur Institute and the tomb of the great scientist were visited and in the afternoon a solemn ceremony, over which M. Millerand presided, took place at the Sorbonne. On May 26, there was a visit to the École Normale in the morning and a reception at the Hôtel de Ville in the afternoon. On May 27 the delegates were received by various learned societies and in the evening there were gala performances at the Opéra and the Théâtre Français. A banquet was held at Versailles on May 28, when the palace was visited and the Grandes Eaux played. On the afternoon of May 29, a garden party, organized by the Institut de France, was given at Chantilly. On the following day the delegates traveled to Strasbourg, where, on May 31, the monument to Pasteur was unveiled and after luncheon the Palais du Rhin was visited. Later in the afternoon the Pasteur Museum and the Hygiene Exhibition was opened and in the evening there was a reception at the Strasbourg town hall.

In connection with the celebrations a Pasteur postage stamp has been issued.

PROFESSOR J. COX, lately professor of physics in McGill University, died on May 13, aged seventy-two years.

PROFESSOR C. NIVEN, F. R. S., lately professor of natural philosophy in the University of Aberdeen, died on May 11, at seventy-eight years of age.

COLONEL G. F. PEARSON, formerly inspector-general of forests in India, died on April 25, aged ninety-six.

WE regret to record also the deaths of Sir Shirley Murphy, known for his work on epidemiology, and of General E. A. Lenfant, the French explorer.

THE Fourth International Neurological Congress will be held at La Salpêtrière in Paris on June 8 and 9, when the subject for discussion will be compression of the spinal cord.

YALE UNIVERSITY OBSERVATORY has awarded a contract to J. B. McDowell and Company, Pittsburgh, for the optical parts of a 26-inch photographic telescope of thirty-six feet focal length. It is expected that this telescope will be in use within a year. It is to be erected at some site south of the equator, probably in South Africa or in New Zealand.

A DELEGATION of American scientific men will attend the Second Pan-Pacific Scientific Congress to be held at Sydney and Melbourne, Australia, from August 13 to September 3. The international meetings will be under the direction of the Australian National Research Council and will include addresses in all fields of science. The American delegates announced by the National Research Council are: C. M. Cook, Jr., zoologist, Honolulu; H. E. Crampton, professor of zoology, Barnard College, New York City; E. M. Ehrhorn, entomologist, Board of Commissioners of Agriculture and Forestry, Honolulu; H. E. Gregory, director, Bishop Museum, Honolulu; William H. Hobbs, geologist, University of Michigan; Ellsworth Huntington, research associate in geography, Yale University; T. A. Jaggar, Jr., volcanologist, Honolulu; Elwood Mead, professor of rural institutions, University of California; W. E. Ritter, director, Scripps Institution for Biological Research; R. R. Sayers, chief surgeon, United States Bureau of Mines; Charles F. Shaw, professor of soil technology, University of California; E. C. Stakman, professor plant pathology, University of Minnesota; L. R. Sullivan, anthropologist, American Museum of Natural History; Otto H. Swezey, entomologist, Honolulu; T. Wayland Vaughan, United States Geological Survey; Nevin M. Fenneman, chairman, division of geology and geography, National Research Council.

UNIVERSITY AND EDUCATIONAL NOTES

A GIFT of $500,000 has been made to Harvard University by Edward Mallinckrodt, chemical manufacturer of St. Louis, toward the erection of a chemical laboratory.

UNDER the will of Walter H. Kimball, of Providence, Brown University receives the major portion of his estate, which is estimated at $300,000.

IN memory of the late Lady Herdman, Sir William Herdman, of Liverpool, who was president of the British Association in 1920, has presented to Liverpool University £20,000 for the provision of a building for the department of geology. The new building is to bear Lady Herdman's name. During the war Sir William and his wife gave £10,000 to the university, in memory of their only son, who was killed in the war.

DR. WILLIAM D. CUTTER has resigned as secretary of the Board of Medical Examiners of New York state to become dean of the New York Post-Graduate Medical School and Hospital.

PROFESSOR EDWARD H. KRAUS, of the University of Michigan, dean of the summer session and former acting dean of the college of pharmacy, has been appointed dean of the college.

DR. THOMAS BURR OSBORNE, of the Connecticut Agricultural Experiment Station, has been appointed research associate in biochemistry in Yale University with professorial rank.

PROFESSOR LEON E. JENKS, formerly of the Universities of Pittsburgh and Buffalo, has been chosen to develop the courses in economic chemistry recently started at the College of the City of New York. He fills the vacancy caused by the appointment by Secretary Hoover of

Professor Frederick E. Breithut as chemical trade commissioner to Germany.

DR. CHARLES HASKELL DANFORTH has been appointed associate professor of anatomy in the Medical School of Stanford University.

MR. L. J. MORDELL, B.A., Cambridge, has been appointed a Fielden professor of pure mathematics at the University of Manchester as from September next.

DISCUSSION AND CORRESPONDENCE

MATHEMATICAL PROPAGANDA

AN unusually significant type of mathematical propaganda is noted in a recent number of the *Jahresbericht der Deutschen Mathematiker-Vereinigung*. It is here stated that as a result of the unfriendly tendencies towards mathematics there has been organized a kind of super-union of the various mathematical organizations in Germany. Twenty-one of these organizations have already associated themselves with this union, which explicitly aims to spread the practical and cultural significance of mathematics and to represent it in the public life of the German people. It aims further to establish a close union between investigation, teaching and practice with a view to their mutual advancement and inspiration.

The union is called *Mathematische Reichsverband* and it aims to hold at least one meeting each year composed of the delegates of the various organizations which belong to the union. Questions involving the work of the individual organizations associated with the union are not to be discussed at these general meetings and, in particular, such questions shall not be decided by a majority vote. On the contrary, the independence of these individual organizations is to be maintained in every respect. It claims to be already a union of *all* German mathematicians independently of whether their interests relate mainly to research or to teaching.

The tendency to bring investigators, teachers and agitators into the same fold found expression in our own country several years ago in the organization of the Mathematical Association of America, but the German movement noted above seems to be a much more pronounced effort towards uniting all the mathematicians of a country for the purpose of combating the unfriendly forces which have already made serious inroads into their favorite domain. These united efforts should result in a deeper study of the place which mathematics is destined to occupy in the civilized world and, in particular, in the educational systems designed to meet the needs of various classes of people.

It remains to be seen whether the mathematical material can be so reorganized that it will appeal strongly to the youths of our generation. The report on the reorganization of mathematics in secondary education, recently issued under the auspices of the Mathematical Association of America, is a serious effort in this direction and is in line with the aims of the union of German mathematicians noted above. Scientists will naturally watch with interest such developments in view of the fact that scientific expositions are frequently affected by the amount of mathematical knowledge that may be assumed on the part of the reader.

G. A. MILLER

PEARL'S BIOLOGY OF DEATH

PEARL'S "Biology of Death," published by Lippincott in the series of Monographs on Experimental Biology, though almost unique in English in content, is remarkably free from the controversial. As a work which has already opened up new fields of research it is desirable that its line of argument should be free from ambiguity and question.

The concluding chapter includes a series of curves purporting to emphasize two things, *viz.*

1. That the trend of human mortality in time is an extraordinarily complex biological phenomenon, in which many factors besides the best efforts of health officials are involved.

2. That for many causes of death a vast lot needs to be added to our knowledge of etiology, in the broadest sense, before really efficient control can be hoped for.

No exception can be taken to the correctness of these two statements, but there does seem considerable doubt that the graphs selected to illustrate them are adequate. This can be shown by reference to Fig. 55, p. 236. Here we have two logarithmic curves representing the weighted average death rate from typhoid fever respectively for countries having highly devel-

oped public health and sanitation (A) and for countries having less highly developed public health and sanitation (B). The A-group consists of Australia, Austria, England and Wales and Germany. The B-group consists of Italy, Jamaica and Roumania. The duration of the time represented runs from 1898 to 1912. Fig. 55 shows a decline in the death rate in both A and B groups at approximately the *same* rate. Pearl remarks, "There is no such large difference as would be expected if organized human interference with the natural history of disease always played" a rôle of immediate and large importance.

Before concluding that these curves indicate a lack of efficacy in public health measures, it would be necessary to continue these curves back to a time before the A-group differentiated itself from the B-group in the matter of possessing a more highly organized system of sanitation. If the two curves could be shown to have diverged since the organization of the A-group sanitation system, their present divergence might represent the effects of sanitation. It is likely that these effects would relatively soon make themselves apparent. In the years immediately succeeding their institution a very marked decline in the death rate in the A-countries might have occurred, attributable to the elimination of preventable deaths. But after this new level or equilibrium had been reached, the new A-curve might run fairly parallel with continuation of the B-curve. The absence of the preventable factor might not materially alter the general form of the A-curve because of its relative insignificance (Pearl, p. 165).

In other words the curves in Fig. 55, instead of being interpreted as minimizing the effects of public sanitation, may be interpreted (I do not assert that I do) as representing the results of two different groups of components; in the case of B the sum of all the factors contributing to typhoid mortality, in the case of A the same sum *minus* the "controllable" factor.

In order to show the limitations of public sanitation in lowering the death rate it would be preferable to reduce the variability in certain factors, *e.g.*, racial susceptibility, climate and diet to a minimum. This can not be secured in the selection of the widely diversified countries, made by Pearl. The effects of public sanitation might be more clearly apparent in following the death rate in the disease in question prior to, during and after the institution of such sanitary measures within the same national and geographic group; *e.g.* the mortality of diphtheria in Germany before and after the institution of antitoxic treatment. Pearl himself follows an analogous method in the case of malaria (Fig. 57) and of yellow fever (Fig. 58).

The objection made above that Fig. 55 need not show what Pearl used it to show can possibly be made clearer by reference to Fig. 56. Here we have logarithmic curves representing the course of the death rate in diphtheria, between 1898 and 1912, in the same A and B groups of countries. The fact that the A-curve is higher than the B-curve probably illustrates the predominant influence of such intangible uncontrollables as racial constitution (heredity), climate and diet. Although the curves in Fig. 55 (typhoid) do not in themselves afford anything contradictory to the interpretation put upon them in the text, the curves in Fig. 56 (diphtheria) seem to offer intrinsic difficulties. There has been no significant decrease in the B-group since about 1903, while in the A-group (*i.e.* where sanitation was well organized) the decrease was continuous except for an interruption to which reference will be made.

Beginning about 1906 in the B-group there is a conspicuous deflection of the curve from the base line representing a significant rise in the death rate which continued till about 1911. It is of interest to note that a similar deflection, *but relatively far less significant*, occurred in the A-curve, beginning about 1907, *i.e.* a year *later* than was the case in the B-curve. A recognition and evaluation of the factors actually responsible for these deflections would be interesting. A purely hypothetical explanation, though a possible one, would be that beginning in 1906 a factor or a group of factors became quite universally operative tending to raise the death-rate in diphtheria. The more highly organized sanitary system of the A-group of countries postponed the effects of these factors for a year and during the few years of their operation succeeded in to some degree counteracting them.

This note does not question the validity of Pearl's theses as presented in the second paragraph but it does suggest that the evidence, particularly Figs. 55 and 56, is inconclusive and ambiguous. These curves do show that there is general downward trend in the death rate regardless of the state of public sanitation, but it is questionable if they do show the relative unimportance of sanitary measures in lowering the death-rate in these particular cases.

JOSEPH L. APPLETON, JR.

TWO MEDITERRANEAN CLOVERS NEW TO THE UNITED STATES

AMONG the specimens received for identification at the Bureau of Plant Industry during the past year are two Mediterranean species of clover, neither of which seems to have been recorded previously from the United States. In view of the possibility of their establishment as weeds in this country, it seems well to place on record the place and date of their first appearance here.

The first species, *Trifolium hirtum* All., is a native of the Mediterranean region and northern Africa. A series of specimens of this species, collected at Farmville, Virginia, on May 15, 1922, has been forwarded by Mr. P. W. Fattig. Mr. Fattig writes that he first found it growing in an old lot which had been cultivated a few years ago, and that a negro who is now cultivating the lot informed him that the clover had been there for about ten years. A few plants were also found by Mr. Fattig growing along fences or in paths at distances of twenty rods, eighty or a hundred rods, and half a mile from the spot where he first noticed it.

The second species, *Trifolium angustifolium* L., occurs also in the Mediterranean region of Europe, Asia Minor and Africa, as well as in the Azores and the Canary Islands. Specimens of this species, collected in a field of California bur clover in Montgomery County, Alabama, in June or July, 1922, were sent for identification by Professor Wright A. Gardner, of the Alabama Polytechnic Institute. Professor Gardner has since written that the seed from which the crop was grown was obtained from the Sherman Grain and Seed Co., Sherman, Texas, and that he has been told that the same clover has appeared in other plantings of seed from the same source, although he has no definite information as to how widely the plant is distributed in Alabama.

Trifolium hirtum is an annual, suggesting the ordinary red clover, *T. pratense,* in its general appearance and pubescence, but smaller. The leaflets are obovate, 1 to 2 cm. long and 6 to 15 mm. wide, broadly rounded, subtruncate, or obscurely notched at apex, finely denticulate, and rather densely pilose on both sides. The sessile, involucrate heads are subglobose or oval, about 1 to 2 cm. long and 1.5 to 1.8 cm. thick (excluding the corollas). The purple-red corollas have a narrow elongate banner. The sessile, turbinate, densely silky-pilose calyx tube is 20-nerved and about 3 mm. long, and the setaceous-subulate teeth are plumose and about 5 mm. long. In fresh specimens the hairs of the calyx are whitish, but in old herbarium specimens they change to brown.

Trifolium angustifolium is also a pubescent annual, reaching a height of one or two feet. Its leaflets are linear or very narrowly linear-lanceolate, 2 to 5.5 cm. long and 2 to 4 mm. wide. The pedunculate, exinvolucrate heads are at first ovoid or oval, becoming at maturity cylindric and reaching a length of 2.5 to 8 cm., with a diameter (exclusive of corollas) of 1.8 to 2 cm. The corollas are "rosy." The sessile, obconic, 10-nerved calyx is about 4 mm. long, and is rather densely hirsute-pilose, while the plumose, setaceous or setaceous-subulate teeth are 4 to 7 mm. long. As in *T. hirtum,* the pubescence of the calyx is white at first, changing to brown or bronze in old herbarium material.

Specimens of both species have been deposited in the United States National Herbarium, the Gray Herbarium, the herbarium of the New York Botanical Garden and the herbarium of Professor L. H. Bailey.

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"THE FRIENDLY ARCTIC"

IN the issue of SCIENCE of March 30, 1923, there appeared two letters—one by Mr. V. Stefansson and the other by Messrs. McConnell and Noice, in which the statement is made that the minister of mines declined to investigate charges made by certain members of the Canadian Arctic Expedition against Mr. Stefansson and the

impression one gets from this is that the minister's refusal to make an investigation was due to his support of Mr. Stefansson's side of the controversy.

To avoid any misconception of the minister's motives in this matter, I wish to give you the following facts:

An inquiry was asked for not by one of the parties to the controversy alone, but by Mr. Stefansson as well.

The minister declined to grant the request of either party for the reason that no good could come of such an inquiry and much harm might be done. Too much publicity, unfortunately, had already been given to the differences that had arisen between members of the expedition and any more was highly undesirable. To avoid further publicity was the minister's only motive in refusing to grant an inquiry.

The main point on which an inquiry was asked for by the party represented by Mr. Jenness was the so-called mutiny at Collinson Point, referred to in "The Friendly Arctic." To designate this incident as a mutiny is using too strong a term, for it was a decision on the part of the so-called mutineers to adhere to instructions originally given them by the Geological Survey in the pay of which organization these men were throughout the whole expedition. One has only to reflect on what a mutiny means and he will realize that if there were sufficient grounds for such a charge steps would have been taken long before this by the government to punish the offenders.

I make this explanation in justice to Mr. Jenness and the men associated with him and trust that no more may be heard of a controversy that has already gone too far and a continuation of which can do no one any good.

CHARLES CAMSELL
Deputy Minister

To the Editor of SCIENCE: It has been pointed out to me that in my comment on the article on "The Friendly Arctic," published over the signature of Diamond Jenness in SCIENCE for July 7, 1922 (see SCIENCE, March 23, 1923), I have made a statement which, although clear in itself, is ambiguous because of its context. I said: "The Minister of Mines (the head of the department in which Mr. Jenness is employed) declined to investigate written charges submitted by Mr. Jenness and four or five of the men who had been in the section of the expedition that disobeyed instructions."

I meant to say exactly what the words here say when divorced from their context. But a sentence earlier in the same paragraph leaves the statement open to being interpreted as one describing an action where the Minister of Mines decided in my favor as against Mr. Jenness and his colleagues. This was not the case and I did not mean to imply any such thing. The position of the Minister, as explained in a brief letter to me and more fully in conversation by himself and by the Deputy Minister of Mines, Mr. Charles Camsell, was that it appeared to him that no investigation was called for by the charges as presented or by the facts in so far as he had investigated them.

In this connection his position is made all the clearer by remembering that I had already asked for an investigation before the charges against me were submitted to the Minister of Mines (the Honorable Charles Stewart) and that I telegraphed to the government immediately on seeing the newspaper account of the charges submitted to Mr. Stewart, urging that the investigation asked for by Mr. Jenness and his colleagues should be promptly and thoroughly carried out. The minister, accordingly, declined not only to make the investigation asked for by my opponents but declined also to make the same investigation when requested by myself. Thus his attitude remains merely one of aloofness from the situation created.

VILHJALMUR STEFANSSON

SCIENTIFIC BOOKS

A Study of American Intelligence. By CARL C. BRIGHAM. Princeton. Princeton University Press, 1923, pp. xxv, 210.

THE purpose of this volume is "to discuss the relations of the army measurements of intelligence to nativity and residence," to analyze, further, the intelligence of the race and nationality groupings uncovered in our recent draft army. The data are taken from the "Psychological Examining in the United States Army" (Memoirs of the National Academy, XV).

The book is divided into two distinct treat-

ments. Part I, occupying one third of the whole, is a review of the already familiar material on the make-up and statistical reliability of the army mental tests. Part II contains the statistical analyses of the army test results as they bear on race and nationality. Figures showing the overlapping of officer scores on those of the native white draft and the foreign born draft are presented. Following these are elaborate tables of the average scores, with P. E.s, of draftees from various nativity groupings. The main theses of the work are here put forth: (1) to discover the differences on the average, with the P. E.s of the differences, in the intelligence scores of the men in the army from various European countries; (2) to examine the correlation of length of residence with average scores in the tests for these same groups.

The findings under the first topic show a decided difference in the test-results for the North European immigrants as compared with those from Southern and Eastern Europe. Professor Brigham, moreover, presents negative data on the alleged language handicap in the testing of the latter groups.

On the second head, the analysis of the materials in terms of years of residence in the United States shows a "steady increase in the average scores with increasing years of residence" (p. 89). Those foreign born who have been in this country over twenty years actually exceed, slightly, the average for the native born white draft.

In interpreting his data further, the writer classifies his groups under the familiar headings of Nordic, Alpine and Mediterranean races. He shows that there has been a marked change in the "racial" extraction of our immigrants in the past two or three decades. The swing has been clearly from Northern to Southern and Eastern Europe. By resorting to the Gobineau race hypothesis held by Madison Grant, Lothrop Stoddard, Charles W. Gould and others the conclusion is arrived at that this shift in the source of European immigration has brought inferior races into this country. The data presented from the army intelligence tests are held to support this as witnessed in the large differences between the scores of nationalities from the former section as compared with those from the latter.

Before concluding his work, the ubiquitous problem of negro mentality is introduced and comparisons made with the European nationalities and the white native born draft and officers. The negro actually ranks below the poorest of the European nationalities: Russia and Poland. (Thus is the white race saved from complete disgrace!)

The conclusions, therefore, to which Professor Brigham would bring his readers may be stated briefly as follows:

(1) The army mental tests are adequate measurements of innate intelligence. The alleged handicaps of the tests for the foreign born draftees do not exist due to the large use made of beta and the performance tests.

(2) The average scores for the native born draftees exceed those of the foreign born.

(3) Further analysis of the foreign born, however, reveals important differences between those of Northern and those of Southern and Eastern Europe.

(4) Appeal is made to the race hypothesis of the Gobineau school to show that the Alpine and Mediterranean races are innately inferior in mentality to the Nordic race. The northern immigrants belong predominantly to the latter, the southern and eastern immigrants to the other two.

(5) Moreover, the change in the composition of the European immigrations in the past two decades has brought an increasingly preponderant inferior racial stock into this country.

(6) Finally, it follows from this that the mixture of the newly arrived inferiors with the formerly arrived superiors will end in a decrease in the native intelligence of our American, *i.e.*, by implication, Nordic stock. The existence of a large body of low-grade mentalities among the negroes complicates the problem still more. Hence steps should be taken to insure the selection of future immigrant strains of higher order, again by implication—the Nordic race only.

Space prevents an adequate critique of such far-reaching results and interpretations. The following aspects seem in need of mention, first in regard to Part I and then in reference to Part II:

(1) The statistical samples of the draftees are biased in favor of those groups of persons

who did not receive exemption for professional service, essential industries and for services of the farm-owning classes. This raises a legitimate question as to possible bias in all the results, but particularly in reference to the foreign born, many of whom must have escaped the draft because of skill in trades or need in war industries. This would leave possibly classes of these groups who did more poorly in the tests than a fair sample of their nationality would indicate.

(2) We are far from being certain that the particular make-up of the alpha, beta and Binet tests are properly weighted in regard to the elements which should go into so-called intelligence. At best we must define intelligence here, as elsewhere, as a purely statistical score in a particular test, or as it has been put, "intelligence as the tests test it."

(3) In considering the actual distributions of the individual tests in the various batteries, the large percentage of zero scores is noteworthy. In all alpha tests but one and two the number of zero scores constitutes the largest quantity for any given measure on the scale. Furthermore all the alpha tests are skewed, principally toward the lower end of the scale. None of the test distributions are "normal" in strict terms of the Gaussian curve; only the results of tests one, three and eight are even roughly so.

The beta results, in contrast to alpha, show a rather uniform skewing toward the upper end of the scale. Also the beta distributions are more variable in form than those in alpha. Tests one, two and six are roughly "normal," but still skewed to the right, tests three and five appear bi- or even tri-modal, while test seven is definitely tri-modal. The extreme complexity of multi-modal curves is well known in statistics, but these difficulties were avoided by the army psychologists in lumping together, by statistical formulae, all data under the Gaussian curve.

Professor Brigham's discussion of the Stanford-Binet tests, used for individual examination, is more critical. Even here his statement that "a rough inspection of these figures (on the Binet results of 1,047 experimental cases) shows that they give us the Gaussian normal distribution" (p. 54) will not bear careful scrutiny as any one may discover who will take the trouble to construct a line graph of the findings as he reports them. We must, then, take exception to his statement that "the results obtained from the Stanford-Binet examination may be taken as entirely reliable without question" (p. 54). In view of the accumulating criticism of the entire testing movement one can not help feeling that this assertion is, to say the least, overdrawn. It is only fair to the writer, on the other hand, to note that his use of the term "mental age" "as a *score* not as a diagnosis" accords with sane practice. He properly criticizes those sociologists, publicists and others who have gone about the country in misconception glibly saying that the average American has the mental ability of a thirteen year old child. In general, however, the writer ignores such essential psychological problems in mental measurement as have recently been raised again by Boring and Yule, accepting, on the whole, the purely statistical approach to his problem.

It is Part II which presents even greater difficulty in criticism. The naïve assumption of an anthropology which scientific workers abandoned two or three decades ago, the confusion of issues by reasoning from intelligence scores of immigrant stocks in this country to the intelligence of the entire racial stock from which they sprang and the implicit one-hundred-per cent. Americanism[1] in the entire discussion of the results makes one pause to wonder whether the book is to be considered science or special pleading. Looking closely at the difficulties in the treatment we note the following:

(1) The novel manner in which Professor

[1] For instance, note the following easy manner in defending the clearly admitted speed element in the tests: "It is sometimes stated that the examining methods stressed too much the hurry-up attitude frequently called typically American . . . If the tests used included some mysterious type of situation that was 'typically American,' we are indeed fortunate, for this is America, and the purpose of our inquiry is that of obtaining a measure of the character of our immigration. Inability to respond to a 'typically American' situation is obviously an undesirable trait." (p. 96). What kind of trait? Mental or emotional? How long does it take to acquire the "typically American" trait? etc.

Brigham has dealt with the question of length of residence of the immigrant groups in this country. He writes: "The results of the psychological tests of foreign born individuals classified according to length of residence . . . . indicate definitely that the average intelligence of succeeding waves of immigration has become progressively lower" (p. 155). He examined the average scores of the various foreign born draftees whose length of residence was classified into five year periods. As noted above there was a steady decrease in the average score with decrease in length of residence. This is not surprising, but the interpretation is quite so. Because the tests show this difference are we to assume that the intelligence of our immigrants, especially those from Southern and Eastern Europe, was actually lower in 1917 than in those who came over in 1897? Sociologists and economists who have investigated immigration have never given us any evidence whatsoever that the sources of immigration, either in terms of geography, economic status or intellectual classes, have altered in the past twenty years to the extent Mr. Brigham's interpretation assumes. For instance, the Italian immigration of the past twenty years has pretty uniformly come from Southern Italy and Sicily, but there is no real evidence that the persons coming from those sections are growing steadily worse from the standpoint of intellectual capacity. We need comparative studies over a much more extended period than the present writer has allowed. It seems to the reviewer that first of all the obvious explanation should suggest itself: the men who were in the draft army whose residence in this country was five years or less came over practically as adults, as we go back further and further in length of residence it means that the persons tested were increasingly younger in age upon arrival in this country, hence they have been longer exposed to American language, customs and culture. It is true, of course, that Professor Brigham has factored out some of the cultural-language difficulties by comparing the scores of non-English speaking Nordics with non-English speaking Latins and Alpines, finding rather marked superiority of the former over the latter. Again this can hardly be interpreted on his hypothesis until we realize the relative speed of assimilation of the non-English speaking Nordics as compared to the Latins and Alpines until, in short, the cultural factors are controlled. The reviewer does agree that the alleged language handicap has been over-emphasized, but he believes we ought not to pass beyond this to the assumption of decreasing mentality in the quinquennial groups of immigrants until more evidence is at hand than the army data give.

(2) His assumption that the samples of immigrants tested represent the mentality of the racial groups from which they sprang is peculiarly pernicious, especially in view of the fact that on page 155 the writer himself so much as agrees that it is dangerous to reason from the intelligence of draftees to that of immigrants and thence from immigrants to races in Europe. He states: "There are so many variable factors determining immigration that the immigrants can not themselves be taken as representative of the country as a whole." Nor, of course, the racial stock as a whole. Yet in spite of his own frank recognition of this difficulty, he proceeds to an extended discussion of races in Europe ending by making an attempt to calculate the racial proportions for each separate country from which foreign born draftees were chosen. For help here he depended on unnamed collaborators.

The entire matter of race criteria is most complicated, as present students of anthropology well know. We are discovering that there are marked elements in all European peoples which go behind the older divisions into Nordic, Alpine and Mediterranean stocks. Furthermore, the criteria for these three stocks are very difficult to define. The most prominent standard for the Nordic is dolichocephalic head-form coupled with blondness. Brigham accredits Sweden as being one hundred per cent. Nordic, yet Retzius some years ago, showed that in Sweden, although accorded by students of anthropology as most predominantly Nordic, eighty-seven per cent. of the population was long-headed and thirteen per cent. decidedly brachycephalic, or Alpine in head form. Similar difficulties are apparent in his rating on Russia and Germany.

The fact is that the whole race hypothesis for European populations has been largely aban-

doned by careful workers in European anthropology. As Retzius pointed out in his Huxley lecture in 1909, there are no races, properly speaking, in Europe at all, only sub-races. Moreover, these sub-races are inextricably mixed with one another. Some writers merge the Mediterranean and Nordic strains as a common sub-race.

(3) The most serious fault with Professor Brigham's book, therefore, lies in his naïve acceptance of the Gobineau anthropology. Only the anthropological innocence of a young psychologist could have led him to quote Madison Grant and Lapouge as authorities whose theses his results support. It is by a curious logic that Professor Brigham shifts from a position critical of applying his data to race problems because of the inadequacy of his sample to one which swallows the propaganda of the believers in the Nordic Race Myth.

Moreover, the first quotations which are given from Grant and Lapouge deal with generalizations on emotional, not intellectual, characteristics of various European peoples. Yet nowhere does the writer of the present book claim to be studying character traits of his samples. He concludes that: "In a very definite way, the results which we obtain by interpreting the army data by means of the race hypothesis support Mr. Madison Grant's thesis of the superiority of the Nordic type." (p. 182)

Professor Brigham frankly accepts the extreme position of the Nordic worshippers that it was the predominant Nordic elements which gave to Egypt, Mesopotamia, Phoenicia, Crete and Greece their cultural greatness. One wonders if one dare ask if those Hittite groups in Asia who first discovered the important use of iron, a use which lies at the basis of the modern industrial world, also owe its discovery to some chance blond, dolicho cephalic Nordic who strayed, God knows how, into their midst? Yet Professor Brigham in a footnote (p. 184) writes of "The Passing of the Great Race," "The entire book should be read to appreciate the soundness of Mr. Grant's position and the compelling force of his arguments."

In summary we may say that starting off with an extremely valuable body of data on individual differences which might well serve as suggestive points of departure for an extended study of the mental ability of immigrant groups in this country, especially through more adequate control of the language and cultural factors, Professor Brigham has unfortunately confused the issue of individual differences within groups with the average difference between groups typified by their central tendencies. As Boas long ago pointed out, the differences between members of the same race are infinitely greater than the differences between the averages of the various races themselves.

The writer could have made a strong case for the fact that we are getting certain elements of European populations which, as nearly as rough intelligence tests indicate, are not likely to enhance the mental qualities of Americans. But to obscure the issue by dragging in the race hypothesis made notorious by Gobineau and H. S. Chamberlain is to destroy the effectiveness of any arguments for eugenic reform, immigration restriction laws, or other sociological measures which might be made. Considerable differences are evident between immigrants from Northern and Southern Europe. Two hypotheses may help account for this: (1) the language handicap in the tests themselves, (2) the fact that the type of cheap, unskilled labor which has come into this country in the past twenty years from Southern and Eastern Europe is from classes in the native populations who are of intellectual inferiority when compared with the skilled tradesmen and peasant farming classes who have come into the country in the same period from Northern Europe.

To answer fully the question, however, of intellectual status of such groups careful control must be made of the factors of opportunity, education and language difficulties. There is much hope in the methods of testing being refined and improved and additions made to take in measures of character and will traits. We shall never pass to this second, advanced stage of work, however, if we rest our case as psychologists on the shifting sands of an antiquated, outworn and mythological race hypothesis.

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SPECIAL ARTICLES

MEALY BUGS ON THE ROOTS AND NODULES OF LEGUMES GROWING IN THE FIELD

BESIDES furnishing the plant on which they occur with nitrogen from the air, the bacterial nodules of legumes are a potential food supply for the organisms of the soil. When the plant begins to decline, the nodule does also and from this time invading organisms, principally the bacteria of decay and fungi, play an important part in their disintegration. In some instances, however, the nodules are attacked while in full vigor, the destruction depending mainly on the presence of certain insects or organisms which utilize the tubercles of certain leguminous plants as food. McConnell,[1] Leonard and Turner,[2] have conducted experiments on the destruction of nodules by the bean leaf beetle larvæ, *Ceratoma trifurcata.* Forst., and McConnell[3] has described another insect found feeding on the nodules of wild legumes.

For a number of years observations have been made on root nodules of various legumes grown on the United States Department of Agriculture Experimental Farm, Rosslyn, Virginia, and in the vicinity of Washington, D. C., but previous to the season of 1919 the presence of mealy bugs on annual legumes in the field was not noted, although a species was found to some extent in the Agricultural Department greenhouses in Washington, D. C. In the field, the insects were usually found on the underground parts of the plant and not once were they observed on the foliage. As high as fifteen mealy bugs have been seen on one soybean nodule. While the insects were also noticed on the roots of the soybean, *Soja max,* Piper, navy bean, *Phaseolus vulgaris,* L., Japan clover, *Lespedeza striata* (Thunb.) H. and A. and chickpea, *Cicer arietinum,* L., the position in which they were generally found indicated a preference for nodules on all except red clover, *Trifolium pratense* L., where they were found in the greatest number on the tap root. Infestations have also been observed on the soybean at points near Washington, D. C., in Maryland and West Virginia, in sufficient number to indicate that the insects are widely distributed in this section.

The mealy bugs which were found on legumes grown in the field in Virginia have been identified[4] as the same species which has recently been discovered in the Arlington Farm greenhouse on potted plants. The species of mealy bug which was found in Maryland is closely related to the one found in Virginia.

The name of this insect is *Pseudococcus maratinus* (Ehrh.) which on the Pacific coast is much more commonly called *Pseudococcus Bakeri,* Essig. Mealy bugs of this species are widely distributed on the Atlantic and Pacific coasts and infest the roots and tops of a large variety of plants. The list of reported host plants includes few annual and biennial legumes: infestations by *Pseudococcus trifolii* Forbes,[5] on red clover, *Trifolium pratense* have been noted from Delaware, Illinois, Indiana, Iowa, Kentucky, Michigan, New Jersey and New York, and on white clover, *Trifolium repens* from Illinois, infestations by *Pseudococcus Bakeri* on lima bean, *Phaseolus lunatus* and by *Pseudococcus citrophilus,* Claussen MSS., on sweet clover, *Melilotus alba,* have been reported from California.[6]

As these observations were incidental to other work the only control plants were those which missed natural infestation. Judging from superficial appearances, there was no difference between the infested and uninfested plants. This is a point, however, which can only be

[1] McConnell, W. R., "A unique type of insect injury," *Jour. Econ. Ent.,* 8: 261-267, 1915.

[2] Leonard, Lewis T., and Turner, C. F., "Influence of *Ceratoma trifurcata* on the nitrogen gathering functions of the cowpea," *Jour. Am. Soc. Agron,* Vol. 10, No. 6, 1918.

[3] McConnell, W. R., "Another nodule destroying beetle," *Jour. Econ. Ent.,* 8: 551, 1915.

[4] Identification of insects and information concerning distribution and general habits kindly furnished by Mr. Harold Morrison, of the United States Department of Agriculture, Bureau of Entomology.

[5] Folsom, J. W., "The insect pests of clover and alfalfa," University of Illinois Agricultural Experiment Station *Bulletin,* 134, p. 190, 1909.

[6] Claussen, C. P., California Agricultural Experiment Station *Bulletin,* 258, 1915.

checked by carefully controlled experiments. Folsom[5] has stated that *Pseudococcus trifolii* will kill clover plants. The possibility of mealy bugs becoming a menace to the nitrogen-fixing functions of some of our common economic legumes leads to the belief that a wider and more thorough investigation of this question should be made.

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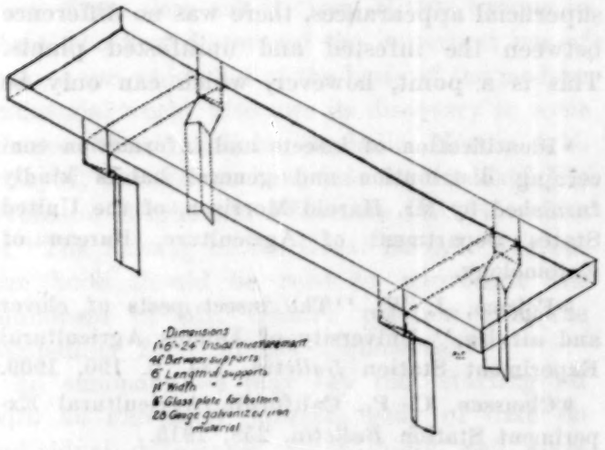
A HISTOLOGICAL SLIDE DRYING PLATE

EXPERIMENTING with a piece of plate glass balanced on top of a steam radiator as a drying plate for histological slides and having this knocked onto the floor and broken is rather disappointing. As a consequence the following piece of apparatus was devised and manufactured.

This slide drying plate is after the fashion of a shallow oblong pan with legs or supports to fit over the coils of a steam radiator. Galvanized sheet iron of number 28 gauge is the material used. The dimensions are as follows: long shallow pan twenty-four by six inches and one inch deep, inside measurement. To the sides of the pan are fastened the supports which fit over the radiator.

These supports are made of the same material as the pan and are one and one fourth inches wide by six inches long. They are fastened to the sides of the pan and to a strip of metal the same width (one and one fourth inches) which goes down the sides and across the bottom of the pan. These are riveted and soldered to the pan. The lower extremities of the supports are bent in the center line to fit more closely to the coils of the radiator for support. The edges of the pan and the legs are turned over five sixteenths of an inch to do away with sharp and rough edges (plate 1).



The pan is one inch deep in order that a glass plate may be fitted to make a smooth and level surface at the bottom below the rim of the pan. The rim or sides of the pan are to hold the slides in place. Five sixteenths of any inch plate glass is used. This is a means of tempering or evenly distributing the heat to all parts of the plate. It does not require much time to heat and retains the heat. Tests showed that the variations in temperature of the center and the sides were only one or two degrees Centigrade.

This slide drying plate does not get too hot for all ordinary drying purposes. Tests which were made averaged the following degrees of temperature with the room temperature between 21°-24° C. or 70°-75° F.

Centigrade	Fahrenheit
45°-55°	113°-131°

The capacity of this plate is forty-six slides.

The advantage of this as used with a steam radiator is that it can be left there and no regulation of the intensity of heat is necessary. The cost of this device is very little as compared to the various types on the market to-day and any tinsmith can manufacture this piece of apparatus. Many modifications are possible to fit one's needs.

RALPH L. PARKER
IOWA STATE COLLEGE
AMES, IOWA

THE AMERICAN CHEMICAL SOCIETY

(Continued)

DIVISION OF ORGANIC CHEMISTRY

Frank C. Whitmore, *chairman*
B. B. Renshaw, *secretary*

Special Program on Catalysis

Photochemistry and catalysis: WILDER D. BANCROFT.

Negative catalysis: HUGH S. TAYLOR.

Preparation of platinum black. Effect of the addition of certain salts on the reduction of aldehydes by hydrogen in the presence of platinum black. (Lantern): ROGER ADAMS WITH WALLACE H. CAROTHERS. A systematic study of the effects of varying amounts of ferrous and ferric chloride on the catalytic reduction of benzaldehyde has

been made. The catalyst employed was the platinum oxide described in a recent paper by Voorhees and Adams. The optimum effect is observed when the amount of iron chloride corresponds to a concentration of approximately 0.0001 gr. mol. in 100 c.c. of the reaction mixture. Certain abnormalities occur in the experiments where large amounts of ferric chloride are used. This is due to the fact that the ferric chloride is first reduced to ferrous chloride and hydrogen chloride and this latter substance affects the reaction. Ferrous chloride shows no abnormalities in the higher concentrations. The explanation for the difficulty in reducing aldehydes with hydrogen and platinum black is simple. The aldehyde is rapidly oxidized by the oxygen in the platinum black, thus rendering the latter inactive as a catalyst. Acting as an anticatalyst, the ferrous chloride specifically inhibits this oxidation.

The relation of enzyme actions to other catalytic actions: K. GEORGE FALK. Specific examples of chemical relations which are catalyzed by enzymes and by hydrogen or hydroxyl ions were given, together with differences and similarities shown by the two sets of actions. Specificities of enzyme actions were compared with specificities of chemical reactions in general. The general chemical nature of enzyme actions was emphasized.

The mechanism of the reactions of esters, acids, alcohols, ethers, amides and alkyl halides at the surface of alumina, titania and thoria: HOMER ADKINS. The subject indicated in the title has been investigated by studying the effect upon the reactions caused by (1) modifying the spacing of the atoms upon the surface of the catalyst (J. A. C. S., October, 1922, March, 1923), (2) diluting the reacting material with water, alcohol, acetic acid, ethyl acetate, phenyl acetate, phenol, acetone, ethylene or heptane. The mechanism of the reactions is concluded to be as follows: Esters attach themselves directly to the catalyst without any preliminary rupture of the molecule, and then rearrange and react with adjacent molecules, to give varying proportions of acid, ketone, olefin, alcohol, carbon dioxide and water, depending upon the spacing of the atoms of the catalyst. Alcohol and ether are equally stable towards alumina and react by a mechanism similar to that of the esters. Acetic acid attaches itself to the surface of the catalyst and then reacts with a second molecule impinging upon it to give acetone, carbon dioxide and water. Formic acid rearranges, as do the esters, to give either water and carbon monoxide or carbon dioxide and hydrogen.

Oxide equilibria in catalysis: J. M. WEISS, C. R. DOWNS and R. M. BURNS. A study was made of the composition of vanadium oxide which exists during the catalytic oxidation of organic compounds such as benzene, naphthalene, anthracene, etc., in the vapor phase. Of the five possible oxides only two, that is, the tetroxide and pentoxide, are present during the reaction. The proportions of these oxides depend upon the ratio of the hydrocarbon to the oxygen. The results of runs using various ratios of air to benzene from 2 to 1 to 15 to 1 are given in a graph. Some speculations are also given concerning the process of catalytic oxidation.

Keto-enol tautomerism: F. O. RICE. The reaction studied was $CH_3COCH_3 + I_2 = CH_3COCH_2I + HI$, in dilute aqueous solution. It is catalyzed both by H^0 and OH^1. The mechanism of this reaction and of keto-enol tautomerism will be discussed in the light of the following results: The velocity of the reaction in presence of buffer solutions has been measured and it was found that in a neutral buffer solution ($H+ = 10^{-7}$) the reaction went as fast as in 0.01 N HCl. The velocity fell as the H° concentration increased up to $H^\circ = 10^{-4}$ at which point the velocity was a minimum. This behavior may be explained by assuming that the catalytic activity of the OH^1 is 10^4 times that of the H° ion. If, however, we assume that dry H^0 and dry OH^1 are the catalysts, they may be present in minimum concentration when the total $H^\circ = 10^{-4}$. Hence at this point catalytic activity would be a minimum.

The application of catalytic reduction to the pyrimidine series: ELMER B. BROWN and TREAT B. JOHNSON. In a study of the application of catalytic reduction to the pyrimidine series using hydrogen in the presence of colloidal platinum or palladium it has been found that uracil and cytosine readily absorb hydrogen at 75° C. and two atmospheres pressure and yield quantitatively dihydrouracil. Dihydro-cytosine was not identified. Thymine and 4-Methyl-uracil are not reduced under similar conditions. Sodium, potassium, calcium and magnesium chlorides did not retard the progress of the reduction. Traces of sulphur compounds greatly retard the reduction process. Neither pepsin, trypsin nor gum tragacanth can be substituted for gum arabic as a colloid support.

The dehydration of alcohols: A. B. BROWN and E. EMMET REID: A study has been made of the composition of ethyl and butyl alcohols by passage over silica gel, thoria, blue oxide of tungsten and alumina at temperatures from 250 to 500 degrees. Complete analyses of the gases have been made. Alumina gives the best yields and the purest ethylene and butylene and the blue oxide

of tungsten the next best. Silica gel is about as active as thoria and gives less aldehyde than thoria. Appreciable amounts of carbon dioxide are produced by all the catalysts, especially by thoria.

The catalytic condensation of acetylene with benzene and its homologues: JOSEPH S. REICHERT AND J. A. NIEUWLAND. In the presence of concentrated sulfuric acid and a mercury salt as a catalyst acetylene combines with benzene to form diphenyl ethane. The reaction is highly exothermic so that cooling is necessary. The best yields are obtained by maintaining a temperature of ten to twenty degrees C. A small amount of dimethylanthracenehydride is also formed in the same reaction by the condensation of two molecules of acetylene with two molecules of benzene. In a similar manner toluene, xylene, mesitylene and ethyl benzene were found to combine with acetylene to form the homologues of diphenyl ethane.

The catalytic combination of ethylene and hydrogen in presence of metallic copper: ROBERT N. PEASE. The kinetics of the catalytic combination of ethylene and hydrogen in presence of metallic copper has been investigated at 0 degrees and 20 degrees, measurements of reaction velocity and of adsorption isotherms of ethylene, hydrogen and ethane having been made. The velocity is approximately proportional to the hydrogen concentration, but increases with decreasing ethylene concentration. Adsorption measurements show that all three gases are adsorbed, the order of adsorption at low pressures being ethylene, hydrogen ethane and at atmospheric pressure ethylene, ethane, hydrogen. The results indicate that both ethylene and hydrogen must be adsorbed before reaction can take place, but that ethylene is preferentially adsorbed from the reacting mixture. The temperature coefficient of reaction velocity between 0 and 20 degrees is 1.7 per 10 degrees. This makes it improbable that diffusion is of primary importance.

The rôle of the catalyst in reactions involving the carbonyl group: HAROLD HIBBERT.

Some considerations about the reactivity of groups in benzene derivatives: A. F. HOLLEMAN. Results of the measurements of reaction velocities of chlorobenzenes, nitrobenzenes and chloronitrobenzenes with sodium methoxide are discussed.

A method for the estimation of the meta isomer in a mixture of ortho, meta and para nitrobenzoic acids: A. W. FRANCIS and A. J. HILL. The method involves first a quantitative reduction of the nitro groups by titration with N/4 titanous chloride, followed by titration with a standard potassium bromide-bromate solution. The meta compound takes up three substituent bromine atoms, while the ortho and para isomers receive but two. The amount of the former may then be calculated after applying a small empirical correction. It is more rapid than most physical methods and may be applied directly to solutions, thus avoiding losses incurred by isolation of the substances. Investigations, designed to extend the generality of this method, are now in progress.

The bromination of 2-amino-p-xylene: A. S. WHEELER and E. W. CONSTABLE. Fisher and Windhaus state that in the bromination of 2-amino-p-xylene (formyl derivative) the halogen atom "probably" enters position 5. We have proved that this is the position occupied as follows: The bromination of the acetaminoxylene gives a new compound, flat needles, m. 186. Hydrolysis with hydrobromic acid gives the hydrobromide, scales, m. 245°. The Sandmeyer reaction converts this into 2.5-dibromo-p-xylene, m. 75°. The proof was made stronger by oxidizing the last compounds with nitric acid in a sealed tube to 2.5-dibromoterephthalic acid, m. 314 and conversion of the acid into its ethyl ester, m. 125°. The last three compounds are known.

The action of sulfur upon p-toluidine in presence of litharge. Thio-p-toluidine; its constitution and some new derivatives: M. T. BOGERT and M. R. MANDELBAUM. The interaction of sulfur and p-toluidine, in presence of litharge (or similar substances) at 140-145° results in the formation first of 3-mercapto-4-aminotoluene. This amino thio cresol then, through the oxidizing influence of the sulfur and litharge, unites with more p-toluidine to thio-p-toluidine, while smaller amounts are oxidized to the corresponding disulfide. The constitution of thio-p-toluidine is proven to be bis (2-amino-5-methylphenyl) sulfide, elimination of the amino groups giving di-m-tolyl sulfide, which latter was also prepared by direct synthesis from m-iodotoluene and m-thiocresol. Incidentally, some new methods of preparation are described, as well as various new derivatives of thio-toluidine.

The reactions of the formamidines XI. The 2-thio-4-thia zolidones. Rhodanins: F. B. DAINS and S. I. DAVIS. Rhodanine S—CSNHCOCH$_2$ and its 3-aryl-substitution products (aryl=phenyl, p-tolyl, etc.) contain a grouping CH$_2$ which shows the usual reactivity of methylene hydrogen. Other investigators have found that it condensed readily with aldehydes and in addition the present work has shown that it reacted readily with the diaryl formamidines and gave products of the type: (A) S—CSNRCOC = CHNPh, or (B) S—CSNHCOC = CHNHPh. B. contains the group-

ing—CSNH—which evidently exists also in the tautomeric form C—SH—N—. This was shown by the fact that the methylene substitution products S—CSHN—COC = CHX, where X is an aryl
: :
or NH aryl, easily formed thio ethers with alkyl or benzyl halides, which have the constitution, S—C—SRNCOC = CHX. This is in harmony with
: :
the behavior of the thio-imidazolones, previously described.

Production of imido thiol esters by the condensation of thio cyanides with resorcinol or phloroglucinol: R. J. KAUFMAN and ROGER ADAMS. Many reactions have appeared in the literature tending to show that the cyano grouping in organic thiocyanates reacts similarly to the cyan grouping in nitrites. This similarity has been shown to exist also in the condensation of thiocyanates with resorcinol and phloroglucinol in the presence of hydrogen chloride and zinc chloride. Whereas the nitriles yield imido-hydrochlorides which hydrolyze to ketones, the thiocyanates yield imido thiol ester hydrochlorides having the following general formula: 1.3—$(HO)_2C_6H_3(4)C(=NH—HCl)SR$. The reaction takes place with both aryl and alkyl thiocyanates. The imido thiol ester hydrochlorides, by the action of sodium bicarbonate, yield the imido thiol esters. These latter substances, upon treatment with alcohols, are converted into the corresponding imido oxygen esters, which in turn may be hydrolyzed to carboxylic esters. The imido thiol ester hydrochlorides may be hydrolyzed to thiol esters which, upon saponification, yield carboxylic acids.

The preparation of alkylguanidines: ROSS PHILLIPS and H. T. CLARKE. Methyl iso-thiourea sulfate, a reagent recently diescribed by Arndt for the preparation of methyl mercaptan, reacts readily with aliphatic primary and secondary amines to yield the sulfates of mono and dialkyl guanidines in almost theoretical yield. This reaction does not take place with aromatic amines. Methylguanidine sulfate and dimethylguanidine sulfate form colorless crystals readily soluble in water but insoluble in alcohol.

The influence of sulphur on the color of azo dyes: D. G. FOSTER and E. EMMET REID. A series of azo dyes has been prepared by coupling various alkyl ethers of o. amino-thio-phenol with standard intermediates with a view to contrasting the dyes containing sulphur and the sulphone group with the corresponding oxygen dyes. The colors of the dyes are related in the same way as in the corresponding para compounds, though the ortho are lighter. The methoxy group deepens the color more than methyl and the methyl-thio ether still more, while this effect is lost by oxidation to the sulphone.

A study of irreversible organic reductions: J. B. CONANT and R. E. LUTZ. The irreversible reduction of certain unsaturated compounds, aromatic nitro compounds and azo compounds has been studied in aqueous, alcoholic and acetone solutions. Each compound was tested with reducing agent of known potential, an electrochemical method being employed to determine whether or not reduction had occurred. The potential at which the irreversible reduction first occurred at an appreciable rate was thus estimated within fifty millivolts. The "apparent reduction potentials" thus determined for a series of compounds in acetone-hydrochloric acid were: $C_6H_5COCH = CHCOC_6H_5 = +0.270$, $C_6H_5COCH = CHCOOH = +0.080$, $HOOCCH = CHCOOH$ below -0.130; $C_6H_5N = NC_6H_5 = +0.360$, $C_6H_3(NO_2)_3 = +0.270$, $C_6H_4(NO_2)_2 = +0.162$; $C_6H_5NO_2 = +0.080$. The change in apparent reduction potential with change in P_H is approximately parallel to the change in potential of the quinones under similar conditions.

Diplumbic hexæthide, a new organometallic compound: THOMAS MIDGLEY, JR., CARROLL A. HOCHWALT and GEORGE CALINGAERT. On heating any alloy of lead and sodium with ethyl iodide no reaction takes place unless water be present, when lead tetraethyl is formed. On treating this successively with hydrochloric acid and sodium hydroxide, first triethyl lead chloride and then triethyl lead hydroxide are produced. When this last compound is electrolyzed in alcoholic solution, a good yield is formed of an oil whose properties agree closely with the formula $Pb_2(C_2H_5)_6$. This compound is entirely different from that of Klippel, whose description indicates that he had undoubtedly produced lead tetraethyl.

CHARLES L. PARSONS,
Secretary

THE AMERICAN MATHEMATICAL SOCIETY

THE two hundred and twenty-ninth regular meeting of the American Mathematical Society was held at Columbia University, New York City, on Saturday, April 28. The attendance included fifty-seven members of the society.

The secretary announced the election of twenty persons to membership and the entrance into the society since the February meeting of three additional members of the London Mathematical Society under the reciprocity agreement.

At the meeting of the Council, Professor Edward Kasner was elected a member of the